

## Final project for Quantitative Methods (Biol 572)

### Objectives:

By now, you should now be able to:

- Describe the distribution of error in your data
- Identify and write out deterministic models
- Combine stochastic and deterministic elements to fit models to the data using likelihood and/or Bayesian methods
- Assess model fit using confidence intervals, likelihood surfaces, etc.
- Compare models
- Interpret the results
- Defend your choices in your analysis

Your final project will involve demonstrating these new skills by analyzing a new data set of your own choosing.

### Dates and timing:

Find a data set (your own, one of your advisor's, or simulate data) with interesting, but tractable ecological questions. Come to class March 20th with a summary description of your dataset and/or graphs and be ready to discuss your questions, the data, and approach to analyzing your data to answer those questions. This is a conversation—I am happy to offer my advice—but one you need to be prepared for.

I have dedicated class and lab time to consultations to help you refine your questions and approach, and get the green light from me.

- ∴ The classes on April 9 & 11 will consist of each of you presenting your data and questions and then getting questions and feedback from the class.
- ∴ The lab on the 10th and the whole week of April 16th is entirely dedicated your projects, answering last minute questions, and helping you trouble shoot questions.

Note that this means that I will *not* be available to answer questions by email, etc. at other times; it just gets to be too much trying to help 13 people with their individual projects and still work on my own things! Feel free to consult your colleagues and whatever materials you need, but remember that the final product must be your own work.

The final written project (see below for details) is due to me by Sunday April 21st midnight. This gives me a *little* bit of time to provide some feedback before you present during the week of April 22nd.

### Format:

This will take the form of an analysis write-up. This means that the focus is on the questions, data, analyses, and conclusions. You need not discuss the broader biological issues typical in introductions or discussions or how the data were collected (except to the extent that it is important for understanding the data). There is no specific page limit, but keep it brief!

You can submit your report as a html file (\*.Rmd → \*.html) or a pdf (allowing you to use your favorite word processor).

### Introduction:

- describe problem and questions
- state specific hypothesis (in words) No silly nulls!

### Methods:

- describe data
  - sampling structure
  - what was measured
  - grouping structure
  - type (count, continuous binomial ...)
  - distribution of variance (stochastic distribution)
  - caveats / constraints
- describe mathematical functions that you are using to test your hypotheses (both deterministic and stochastic aspects)
  - provide the equation(s) as relevant. If you have multiple versions of one equation, just provide one version and explain how the other versions differ.
- state your specific predictions (given your hypotheses) in terms of the models and/or parameters
- Explain analyses (briefly... focus on what you did, not how you did it):
  - fitting method
  - caveats / constraints
  - goodness of fit testing / validation
  - is it consistent with reality? with logic?

### Results & Discussion

Show and describe **relevant** results (if they are not helping make a point, delete them!)

- summary tables and plots with descriptions pointing out useful bits
- these need to be professional quality with appropriate labels and captions

Interpret analyses and results in light of your hypotheses

- make sure you answer the questions you set out to address!
- be clear about your certainty in these answers and why (i.e., evidentiary weight, probabilities, CIs, logic)

### Acknowledgements

- Thank your friends for all of their help!

### References

- I'm not looking for a thorough literature review, but if you use a specific method or data or what not, cite it. You are a professional.
- DO NOT cite Brunner personal communication... that would be silly.
- Do cite Bolker 2007 and any other methods-related references you used.
- Cite specific R packages you use. (the `citation()` function will usually give you the reference information for a package. E.g., `citation(bbmle)` .)